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pressed hope (p. 349, note) that he has not misrepresented the doctrine of control of these writers, the present reviewer feels compelled to say he has misrepresented it by identifying it with his own doctrine of "inner" control!

The most characteristic feature of this volume, as of the previous one, is Baldwin's dualism of inner and outer controls. He holds, however, that the two controls exist only for the knower, "for consciousness" (p. 5, note), and only in the logical mode of thought. I suppose he intends to show that this dualism of controls is really phenomenal—in the third volume. Otherwise it is an important book and one that specialists in logical theory will welcome.

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BOTANICAL NOTES

DR. RUTH MARSHALL has given us an instructive pamphlet on the "Ferns of the Dells of the Wisconsin River," illustrated by halftone reproductions of photographs of the ferns themselves, and their rocky and often picturesque environment. A pleasantly and somewhat popularly written text adds to the interest of the pretty booklet.

FROM far-away Trinidad come three papers by J. B. Rorer on plant pathology—"Bud-rot of the Coconut Palm," "Black-rot and Canker of Cacao" and "A Bacterial Disease of Bananas and Plantains." The exact relationship of the organism in the latter case has not yet been made out.

DR. GROTH's paper on the "Structure of Tomato Skins" in the Bulletin of the New Jersey Experiment Station (No. 228) will interest histologists as well as those who are studying the structural differences between closely related plants.

WILLIAM BEUTENMÜLLER's recent contributions (*Bull. Am. Museum of Nat. Hist.*, vol. 28) on certain gall-producing insects is of interest to botanists as well as entomologists, since the galls themselves are strictly botanical. Excellent illustrations accompany the papers.

PROFESSOR PHILLIPS contributes materially to our knowledge of the life history of the junipers in his paper on "The Dissemination

of Junipers by Birds" (*Forestry Quarterly*, vol. 8) in which he gives facts from which he reaches the conclusion that "birds are responsible for most of the dissemination of junipers," and that "mammals distribute only a small proportion of juniper seeds."

A PAPER on "Reforestation Operations" in the fifteenth Annual Report of the New York Forest, Fish and Game Commission, by E. R. Pettis, is full of helpful suggestions for all who are interested in this phase of the general subject of forestry. It is illustrated by many fine half-tone reproductions of photographs.

THE Report of the State Botanist (of the New York State Museum) for the year 1909, contains the usual lists of species not before reported (including no less than 38 flowering plants): some discussions of certain species; notes on certain species of edible fungi; new species from outside the state of New York; a monograph of New York species of *Inocybe*, and a similar treatment of the species of *Hebeloma*. Ten good colored plates accompany the report.

PROFESSOR C. E. LEWIS describes (*Bull. Maine Expt. Station*, No. 178) a new species of *Endomyces* (*E. mali*) which he discovered in a study of apple decay. Cultural and cytological comparisons are made with other species, and the paper is illustrated with drawings and half-tones of photographs.

IN another bulletin (No. 174) of the same station Professor W. J. Morse describes a stem and tuber disease of the potato which has assumed "rather grave aspects" and to which the name "blackleg" has been given. It is widespread in the United States from South Carolina to Maine, and westward to Colorado, and possibly further west, although often found only in isolated localities. It has not yet been determined whether or not the bacteria are identical with any hitherto described. It is probably spread by means of infected seed tubers.

ORMOND BUTLER's "Observations on the California Vine Disease" (*Mem. Torr. Bot. Club*, XIV., 2) lead him to the conclusion that it "is due to some weakness in the functions of absorption and translocation of water

becoming manifest when conditions favoring transpiration are marked." The disease is therefore not due to the presence of parasitic organisms, but is what has been rather loosely called a physiological disorder.

IN a short paper in the *Annales du Jardin Botanique de Buitenzorg* (2d Ser., Supp. III.) Professor Ramaley enumerates and discusses the European plants growing without cultivation in Colorado. In addition to an annotated list of species the author discusses the region included, and the mode of introduction and occurrence of the species. Botanists who have not given attention to these immigrants will be much surprised at the extent of the list.

PROFESSOR SARGENT continues his studies of the species of hawthorns in Pennsylvania in a paper entitled "*Crataegus in Pennsylvania, II.*," published in the *Proceedings of the Academy of Natural Sciences of Philadelphia* (March, 1910). His first paper on the Pennsylvania hawthorns appeared about five years ago, since when much additional material has become available for study, resulting in a thick pamphlet of about one hundred pages. In this space the author enumerates and describes 110 species, of which 80 are described as new! Think of what the new editions of the botanical manuals will have to contain when these new species are added! We may have to grant the necessity of distinguishing these forms from one another in descriptive botany, but what an amount of work will have to be done by the taxonomists of the future in reducing these multitudinous forms to such categories as will be distinguishable by botanists, other than specialists in the hawthorns!

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SPECIAL ARTICLES

SEX LIMITED INHERITANCE IN *DROSOPHILA*

IN a pedigree culture of *Drosophila* which had been running for nearly a year through a considerable number of generations, a male appeared with white eyes. The normal flies have brilliant red eyes.

The white-eyed male, bred to his red-eyed sisters, produced 1,237 red-eyed offspring, (F_1), and 3 white-eyed males. The occurrence of these three white-eyed males (F_1) (due evidently to further sporting) will, in the present communication, be ignored.

The F_1 hybrids, inbred, produced:

2,459 red-eyed females,
1,011 red-eyed males,
782 white-eyed males.

No white-eyed females appeared. The new character showed itself therefore to be sex limited in the sense that it was transmitted only to the grandsons. But that the character is not incompatible with femaleness is shown by the following experiment.

The white-eyed male (mutant) was later crossed with some of his daughters (F_1), and produced:

129 red-eyed females,
132 red-eyed males,
88 white-eyed females,
86 white-eyed males.

The results show that the new character, white eyes, can be carried over to the females by a suitable cross, and is in consequence in this sense not limited to one sex. It will be noted that the four classes of individuals occur in approximately equal numbers (25 per cent.).

An Hypothesis to Account for the Results.—The results just described can be accounted for by the following hypothesis. Assume that all of the spermatozoa of the white-eyed male carry the "factor" for white eyes "W"; that half of the spermatozoa carry a sex factor "X" the other half lack it, *i. e.*, the male is heterozygous for sex. Thus the symbol for the male is "WWX," and for his two kinds of spermatozoa WX—W.

Assume that all of the eggs of the red-eyed female carry the red-eyed "factor" R; and that all of the eggs (after reduction) carry one X, each, the symbol for the red-eyed female will be therefore RRXX and that for her eggs will be RX—RX.

When the white-eyed male (sport) is crossed with his red-eyed sisters, the following combinations result: